AMENDMENTS TO THE SPECIFICATION

The following amendments have been made to the Specification in response to the § 112 (paragraph 1 and paragraph 2) objections noted by the Examiner:

Replace the first full paragraph on Page1 with the following paragraph:

The present invention relates to microwave filter, and in particular, to <u>a</u> superconductive microstrip resonator and filter.

Replace the second full paragraph on Page1 with the following paragraph:

Filters are important Microwave components~~, whose primary function is to compart frequency, namely~~ <u>required</u> to transmit signals within a desired frequency band and to filter out signals beyond the desired frequency band. Generally a frequency band within which signals can pass through a filter is called <u>the</u> pass-band, and a frequency band within which signals are filtered out by the filter is called <u>the</u> cut-off region. An ideal filter can transmit signals in a pass-band without attenuation, and cause signals in the cut-off region to attenuate infinitely. To achieve the above effect, the ~~saltation~~ <u>transition</u> between pass-band and cut-off region should be as steep as possible, namely the pass-band edges should be as steep as it could be. Commonly<u>,</u> poles of the filter (the amount of resonator) can be added to increase the steepness of the pass-band edges, but this will bring distinct insertion losses, causing the attenuation of the pass-band <u>to</u> become larger and exacerbating the performance of the filter. So a

normal microstrip filter with more poles has a larger insertion loss, which is difficult to meet the needs in the fields of high standard requirements, such as satellite applications. In this instance only wave-guide filter can be applied to achieve the requirements.

Replace the first full paragraph on Page 2 with the following paragraph:

Recently, with the development of techniques of preparation for HTS (high temperature superconductive) materials, including preparation for single crystal and thin film etc, ~~it's~~ <u>it is</u> possible for superconductive microstrip to ~~come to~~<u>be used in</u> practical ~~application~~<u>applications</u>. Comparing with common microstrip filters, a superconductive microstrip filter has lower insertion loss, better anti-interference ability against neighbor frequency, higher Q value of the resonator (below 10 GHz, Q value is about 40,000-100,000). Experiment results show that a superconductive microstrip filter has steeper band-edges, extremely low insertion loss and flat pass-band characteristic, which is close to the ideal filter in performance. A superconductive microstrip filter also has the merit of smaller volume and lighter weight as compared with common microstrip filter. With the above characteristics, superconductive microstrip filters, instead of wave-guide filters, shall be employed in fields having higher requirements for filters.

Replace the last paragraph on Page 2 (which is continued on page 3) with the following paragraph:

FIG. 1 shows an superconductive microstrip filter invented in England in 2000, which comprises 8 open-loop form resonators in the same or similar size, having a substrate of LaAlO.sub.3, ~~with~~ <u>wherein</u> the total ~~length/width of the filter of 39/23.5 mm~~

length of the filter is 39mm and the total width of the filter is 23.5mm.~~,~~ As shown in FIG. 1, in this superconductive microstrip filter, resonator ~~1, 2 . . . 8~~ 1, 2, 3, 4, 5, 6, 7, and 8 are disturbed in an axis symmetric configuration, the intervals between the resonators are determined by requirements for the performance of the microstrip filter. Each resonator is made of an superconductive microstrip line which is folded like a ring structure with a gap of width Wg~~ wide gap~~, the total length of the ring structure microstrip line is about a half of the wavelength corresponding to the center frequency of superconductive microstrip filter. ~~It is learned by analyzing electromagnetism field of each resonator that~~Here, the electric field is mostly concentrated at the gap of the ring structure, so this part of the resonator is like a capacitance; the magnetic field is mostly disturbed on the other side of the resonator opposite to the gap, so the superconductive microstrip line functions similarly to an inductance. The width WO of the input feed-line 1 and output feed-line 12 corresponds to 50.OMEGA. of input impedance and output impedance. Because the lengths of the input feed-line 11 and output feed-line 12 have no influence on the filter performance, the respective lengths could be several millimeters in accordance with technique requirements. The positions at which the input feed-line 11 and output feed-line 12 are connected to neighboring resonator 1 and 8 are determined by input and output impedance matching.

Replace the second paragraph on Page 3 (which is continued on Page 4) with the following paragraph:

FIG. 2 shows the frequency response of the superconductive microstrip filter in FIG. 1 at 55K when combined with a LNA (low noise amplifier). In FIG. 2, solid line 21 indicates the characteristic curve of transmission loss of the superconductive microstrip filter,

dash line 22 represents characteristic curve of reflect loss of the superconductive microstrip filter. In FIG. 2, the X-axis "Frequency (MHz)" denotes the frequency of the signals in mega-Hertz. S11 and S21 denote the transmission loss values of 21 and 22. It can be seen from the figure, the insertion loss of the filter is about 0.13 dB at pass-band, the steepness of the low band-edge is 20 dB/MHz, the steepness of the high band-edge is 15 dB/MHz. While this type of superconductive microstrip filter has high Q value, low insertion loss and good band-edge steepness, the resonators constituting the superconductive microstrip filter are too large to effectively use a substrate space, therefore the poles of the filter can not be increased by increasing the number of the resonators, whereas increasing the number of the resonators can substantially improve the steepness. Hence, the above described structure is not satisfying

Replace the section heading on Page 4, "CONTENT OF THE INVENTION", with the following section heading:

~~CONTENT~~ SUMMARY OF THE INVENTION

Replace the first two paragraphs on Page 6 in the "Brief Description of Drawings" section with the following two paragraphs:

FIG. 1 shows a simplified view of the configuration of a prior art superconductive microstrip filter comprising 8 open-loop resonators;

FIG. 2 is a response curve of the prior art superconductive microstrip filter shown in FIG 1;

The first full paragraph on Page 7 should be replaced with the following paragraph:

FIG. 3 shows a simplified view of a U-type superconductive microstrip resonator of the present invention. As shown in the figure, the U-type superconductive microstrip resonator has a U-type structure formed by folding a superconductive microstrip line. ~~Wherein~~ Here, the whole length of the superconductive microstrip line bent to U-type is as long as a half of the wavelength corresponding to the center frequency of a superconductive microstrip filter formed with the U-type resonators. In this U-type structure, 33 denotes the blind end and 34 denotes the open end. 31 and 32 represent superconductive microstrip lines on both sides of the open end 34 respectively, which are in different length. The respective lengths of superconductive microstrip lines 31 and 34 on both sides of the open end 34 and the distance between them are determined in accordance with particular requirements for designing the superconductive microstrip filter comprising ~~said~~ the U-type superconductive microstrip resonators.

Replace the last paragraph on Page 7 (which is continued on Page 8) with the following paragraph:

FIG. 4 shows a simplified view of the configuration of a superconductive microstrip filter comprising 4 U-type superconductive microstrip resonators of the present invention. As the material of the substrate of the filter (not shown in FIG. 4), $LaAlO_3$ ~~LaAlO3~~, MgO and Sapphire etc. could be used. As shown in FIG. 4, an input feed-line 401 of the superconductive microstrip filter receives signals to be filtered and transmits them to an input coupling line 411. The input coupling line 411 then couples

the signals received from the input feed-line 401 to the array of resonators comprising 4 U-type superconductive microstrip resonators 42, 43, 44 and 45 which are in the same dimension and structure.

Replace the first complete paragraph on page 8 with the following paragraph:

After receiving signals from the input coupling line 411, ~~said~~ the array of resonators filters the signals to obtain signals in corresponding frequency band, and couples the resultant signals to output coupling line 412. The U-type superconductive microstrip resonators 42, 43, 44 and 45 are arranged in parallel with each other from left to right in this order. ~~Wherein~~ Here, the U-type superconductive microstrip resonators 42 and 43 are arranged in parallel and are axis symmetric with respect to each other, and their longer sides at the open end are closer to the axis of symmetry than the shorter ones respectively. The U-type superconductive microstrip resonators 44 and 45 are in the same arrangement as the resonators 42 and 43. The intervals 11, 12 and 13 between U-type superconductive microstrip resonators 42 and 43, 43 and 44, 44 and 45 respectively are determined in accordance with particular requirements for designing the superconductive microstrip filters. At the open end of the U-type superconductive microstrip resonator 42 which is adjacent to the input coupling line 411, the top end of the left side of the U-type resonator 42 is aligned with the input coupling line 411. The same is true for the top end of the right side of the U-type resonator 45 and the output coupling line 412.

Replace the last paragraph on Page 9 (which is continued on Page 8) with the following paragraph:

FIG. 5 shows a response curve of the superconductive microstrip filter shown in FIG. 4. As shown in FIG. 5, the solid curve 51 represents the transmission loss of the superconductive microstrip filter, and the broken curve 52 denotes the reflection loss of the superconductive microstrip filter. In FIG. 5, the X-axis "Frequency (MHz)" denotes the frequency of the signals in mega-Hertz. The Y-axis "S Parameters" denotes the signal loss value of the microstrip filter. It can be seen from FIG. 5, the insertion loss of the superconductive microstrip filter's pass band is 0.3 dB, and the band-edge steepness is 35 dB/MHz in low-frequency side and 30 dB/MHz in high-frequency side. With the increase of the poles of the filter, the band-edge steepness of the superconductive microstrip filter can be greater, then rejection beyond the pass-band will be higher.

Replace the first complete paragraph on Page 10 with the following paragraph:

FIG. 6 shows a simplified view of the configuration of another superconductive microstrip filter comprising 4 U-type superconductive microstrip resonators of the present invention, as the material of the substrate of the filter (not shown in FIG. 6), $LaAlO_3$ ~~LaAlO3~~, MgO and Sapphire etc. may be used. As shown in FIG. 6, an input feed-line 601 of the superconductive microstrip filter receives signals to be filtered and send them to a input coupling line 611. The input coupling line 611 then sends the received signals to the array of resonators comprising 4 U-type superconductive microstrip resonators 62, 63, 64 and 65 which are in the same dimension and structure. FIG. 6 also shows another embodiment 650 of the superconductive microstrip resonators, where the longer arm is closer to an axisymmetrical point of the orientation.

Replace the last paragraph on Page 11 (which continues on Page 12) with the following paragraph:

FIG. 7 shows a response curve of the superconductive microstrip filter shown in FIG. 6. It can be seen from FIG. 7, the solid curve 71 represents the characteristic curve of transmission loss and the broken curve 72 denotes the one of reflection loss for the superconductive microstrip filter mentioned above. In FIG. 7, the X-axis "Frequency (MHz)" denotes the frequency of the signals in mega-Hertz. The Y-axis "S Parameters" denotes the signal loss value of the microstrip filter. According to this figure, the insertion loss of the superconductive microstrip filter's pass band is 0.29 dB, and the band-edge steep is 27 dB/MHz on low-frequency side and 19 dB/MHz on high-frequency side. In the case of increasing poles of the filter, the band-edge of the superconductive microstrip filter will be steeper, resulting in higher rejection beyond the pass-band.

Page 12, the section heading "FAVOURITE RESULTS" should be deleted.